Patterns of benthic production in Puget Sound: where and why do bivalves grow best?

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Circulation and productivity patterns in Puget Sound have intrigued oceanographers for decades, but little attention has been paid to the responses of organisms along the shore. Bivalves serve as integrators of food supply and water quality, as well as reflecting shoreline conditions. We outplanted juvenile oysters *(Crassotrea gigas)* on tiles to intertidal sites in south and central Puget Sound during summers of 2002-2004. Growth rates varied significantly among sites, with generally higher growth in south Puget Sound. Water column fluorescence, a measure of chlorophyll in the water column, was slightly higher at southern sites (8 ug/L) relative to central Sound (6 ug/L). Stable isotope analyses provided some evidence that enhanced productivity may be due in part to anthropogenic nutrient loading. In a parallel study with mussels, productivity was restricted by small-scale density dependence: growth rates did not vary consistently among sites but instead were inversely related to mussel density. These data suggest that intertidal suspension feeders experience well-mixed conditions through much of Puget Sound, except in enclosed inlets. Further, the previously documented diversity gradient in biota is unlikely to be caused by productivity, because higher-diversity sites actually occur under lower secondary production.